

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 99104/K/AI	FOR FURTHER ACTION		See item 4 below
International application No. PCT/EP2004/008322	International filing date (day/month/year) 24 July 2004 (24.07.2004)	Priority date (day/month/year) 28 July 2003 (28.07.2003)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant UHDE GMBH			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report |
| <input checked="" type="checkbox"/> Box No. II | Priority |
| <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI | Certain documents cited |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis.2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 740 14 35	Date of issuance of this report 12 June 2006 (12.06.2006)
	Authorized officer Ellen Moyse Telephone No. +41 22 338 89 75

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

Translation

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

Applicant's or agent's file reference

99104/K/AI

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/EP2004/008322

International filing date (day/month/year)

24.07.2004

Priority date (day/month/year)

28.07.2003

International Patent Classification (IPC) or both national classification and IPC

Applicant

UHDE GMBH

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/008322

Box No. 1

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
- a. type of material
- ☐ a sequence listing
- ☐ table(s) related to the sequence listing
- b. format of material
- ☐ in written format
- ☐ in computer readable form
- c. time of filing/furnishing
- ☐ contained in the international application as filed.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/008322

Box No. II

Priority

1. ☒ The following document has not yet been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/EP2004/008322

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>1-6</u>	YES
	Claims _____	NO
Inventive step (IS)	Claims <u>1-6</u>	YES
	Claims _____	NO
Industrial applicability (IA)	Claims <u>1-6</u>	YES
	Claims _____	NO

2. Citations and explanations:

Reference is made to the following document:

D1: WO 02/068084 A (FLUOR CORP; REDDY SATISH (US))
6 September 2002 (2002-09-06)

1. Document D1 is considered the closest prior art over the subject matter of claim 1. It discloses (see page 4, line 6 - page 5, line 3 and figure 1) a system and a process for extracting H₂ and CO₂ from natural gas. In the system, first the hydrocarbons contained in the natural gas are broken down in a reformer (114) by steam and subsequently fed to a shift conversion stage (118), a gas stream predominantly containing CO₂ and H₂ being generated. This gas stream is then fed to a gas scrubber ("CO₂ scrubber" 130), with a first gas stream being generated which contains over 80 mol% CO₂ and a second (implicitly hydrogen-rich) gas stream being produced which is fed to a pressure-swing adsorption system (140) and separated into a product stream consisting of more than 99 mol% H₂ and also a waste gas stream. This waste gas stream and the first gas stream from the gas scrubber are fed to a self-cooling system (150) which generates a product stream which contains over 98 mol% CO₂ and also a further waste gas stream. A part of this waste gas stream (about 30% by volume) is recirculated to the burner of the reformer.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/008322

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

1.1 The subject matter of claim 1 therefore differs principally from the known process in that downstream of the gas scrubber a part of the hydrogen-rich gas stream is branched off and is recirculated to the reformer as combustion gas together with the entire unprocessed waste gas stream from the pressure-swing adsorption system.

The subject matter of claim 1 is thus novel (PCT Article 33(2)).

1.2 The problem addressed by the present invention can therefore be considered that of specifying an alternative process for extracting hydrogen from a gas containing methane, in particular natural gas, in which only small amounts of carbon dioxide are released into the environment.

No prior art document teaches or indicates the solution proposed in claim 1 of the present application for this problem.

Therefore claim 1 involves an inventive step (PCT Article 33(3)).

1.3 Claims 2 and 3 are dependent on claim 1 and thus likewise meet the PCT requirements for novelty and inventive step.

2. The same argument applies *mutatis mutandis* to claims 4-6 directed at the corresponding apparatus.
Claims 4-6 thus meet the PCT requirements for novelty and inventive step.